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NORTH AMERICAN AIR DEFENSE COMMAND

W O R

WEEKLY INTELLIGENCE REVIEW (U)

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Weekly
Intelligence
Review

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The WIR in Brief

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MISSILE RANGE FIRING LOG PRESENTED
Several types of ICBMs fired during preceding week.

Space

SOVIET TOPSIDE-SOUNDER SATELLITE WILL
FURTHER SOVIET IONOSPHERIC RESEARCH

US and Canada have already carried on this type
research.

COSMOS 46 PROBABLY THE 10th SOVIET PHOTO-
RECCE VEHICLE LAUNCHED THIS YEAR

Launched only 11 days after launch of Cosmos 45.
INTEREST IN MANNED INTERPLANETARY FLIGHT
A COVER FOR INTEREST IN SPACE STATIONS,
LUNAR FLIGHT

Soviets unlikely to try manned flight of more
than 14 days for long time yet.

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COVER: Missile-carrying Soviet submarine.
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Missile Range Firing Log Presented

US radar detected the following Soviet missile launches between 2400Z, 14 September, and 2400Z, 28 September 1964:

<u>Time & Date</u>	<u>Type</u>	<u>Launch Site</u>	<u>Range</u>
0803Z, 16 Sep	SS-4 MRBM	Kapustin Yar	1,050 n.m.
0616Z, 24 Sep	SS-10 ICBM	Tyuratam	3,400 n.m.
0753Z, 24 Sep	SS-8 ICBM	Tyuratam	3,400 n.m.
1205Z, 24 Sep	Cosmos 46*	Tyuratam	Orbital
0403Z, 25 Sep	SS-9 ICBM	Tyuratam	7,000 n.m.
0559Z, 25 Sep	SS-7 ICBM	Tyuratam	3,400 n.m.
0520Z, 26 Sep	SS-7 ICBM	Tyuratam	3,400 n.m.

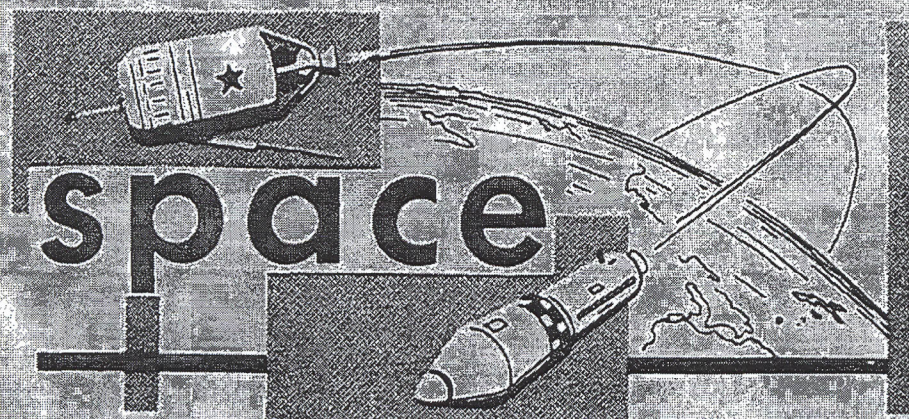
* Launched by SS-6 ICBM booster and sustainer and Lunik upper stage.

(Shemya & Diyarbakir RADINT)

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significant
intelligence
on space
developments
and trends

Soviet Topside-Sounder Satellite Will Further Soviet Ionospheric Research

The Soviets plan to develop an ionospheric topside-sounder satellite, a vehicle which will enhance their ionospheric research considerably.

Topside sounding has not been listed as part of the Soviets' IQSY (International Quiet Sun Year) program, but Dr. N. V. Pushkov, Soviet vice-president of the IQSY, in discussing Soviet IQSY participation, has said that "Soviet explorers will work throughout the entire layer of the ionosphere, sounding it from above by satellites and from below by ionosphere sounders."

A topside sounder is an orbiting version of instrumentation used on the ground for routine observation of the ionosphere. The equipment is basically a low-frequency radar which receives echoes from the ionosphere. By using different frequencies, an altitude profile of electron density of the ionosphere can be obtained, up to the altitude of maximum density. Topside sounders, which may be either swept-frequency or fixed-frequency in design, take soundings of electron density in the atmosphere above the area of maximum density.

A knowledge of the electron-density distribution of the ionosphere is useful toward understanding and predicting the effects of the ionosphere on radiowave propagation and of changes in the ionosphere, such as those caused by solar activity. Such studies also contribute to a better understanding of the interactions between the Earth and the space environment.

The Soviets have previously carried out other research in this field with certain satellites, including the Electron series vehicles and some of the Cosmoses launched from Kapustin Yar.

The US and Canada have both conducted topside sounding of the ionosphere. Rockets using fixed-frequency topside sounders were launched by NASA from Wallops Island in 1961. The US-launched Canadian satellite Alouette, launched 29 September 1962, carried a swept-frequency topside sounder which has produced so much data that analysis has not been completed yet.

(CIA; NORAD)

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Cosmos 46 Probably The 10th Soviet Photorecce Vehicle Launched This Year

The Soviets launched Cosmos 46 from Tyuratam (TT) at about 1205Z, 24 September 1964. TASS gave out its usual stereotyped announcement 2.5 hours later stating that the new vehicle was collecting scientific data about the near-Earth space environment, in accordance with a program which was announced on 16 March 1962, when the first Cosmos was launched. Indications are, however, that Cosmos 46 is a recoverable photoreconnaissance satellite, although it could be collecting scientific data as a secondary mission. It is the 22d TT-launched recoverable Cosmos, the 10th this year. (See WIR 38/64 for a description of the Cosmos-series vehicles.)

Orbital parameters have been announced as follows for the new vehicle:

	<u>By SPADATS</u>	<u>By TASS</u>
Inclination	51.25 degrees	51.3 degrees
Period	89.16 minutes	89.2 minutes
Apogee	263.5 kilometers 142.3 n.m.	271 kilometers 146 n.m.
Perigee	211.8 kilometers 114.4 n.m.	215.0 kilometers 116 n.m.

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There were 3 unusual features of this launch:

- It came only 11 days after launch of Cosmos 45, another presumed photoreconnaissance vehicle.
- It occurred about 2-4 hours later than is usual for TT Cosmos launches. This will cause the vehicle to pass over the US and southern Canada in the afternoon, whereas its predecessors passed over the same territory at about mid-day; thus the Soviets may be trying to obtain photography having more shadow, a factor which helps to delineate some targets better and may add useful detail to previously obtained photography. Another possibility is that the Soviets now want more and/or better photography of targets at more southerly latitudes. With the new launch time, Cosmos 46 crosses the equator on its ascending passes at about the middle of the day (local time), when lighting is best for photography.



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- The orbital inclination of 51 degrees is unusual but is becoming less so: Cosmos 46 is the third TT Cosmos to have a 51-degree inclination. All others have had 65-degree orbits. A 51-degree orbit gives better photographic coverage of southern Canada and the US and allows greater latitude in de-orbit and recovery.

(SPADATS; TASS; NORAD)

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Interest In Manned Interplanetary Flight A Cover For Interest In Space Stations, Lunar Flight

Two articles in recent issues of the Soviet armed forces newspaper Red Star, "Rehearsal for Interplanetary Flight," and "The Crew of an Interplanetary Ship," describe a number of experiments which purport to relate to the solution of problems of manned interplanetary flights, which would require months, even years, to execute.

The first article tells about experiments in which humans remained for lengthy periods in nonstandard atmospheres and about the effects observed.

- In the first test, the cabin pressure was less than normal -- which would allow the spaceship to be lighter -- but the oxygen supply apparently was normal. It was noted that under these conditions, which were sustained for two months or more, the body's demand for oxygen lessened, the body gave off less heat, the pulse rate rose, arterial pressure was lowered somewhat, and the number of bacteria in the cabin's atmosphere and on the skin of the cabin's occupants increased by several times. It was concluded however, that a moderate lowering of the cabin's air pressure did not harm the brain's blood supply, respiration, or heart action.
- In the second test, helium was substituted for nitrogen in the cabin's atmosphere. This is advantageous, according to the article, because "Helium is significantly lighter than nitrogen, it does not burn, and it does not dissolve in the fatty tissues of the body or in the blood. Thus... the danger of the 'bends' is significantly reduced during cabin decompression.... The use of helium would also prevent harmful effects of induced radiation of molecular nitrogen in the space environment. The weight of the ship would also be less, since less energy would be expended in ventilation." The test noted some changes in biomedical parameters but concluded that the health, behavior, and efficiency of the test subjects and the functioning of their respiratory systems and of their hearts had not been impaired. Similar US experiments indicate, however, some disadvantages for helium: leakage, if any, is faster, and there would be less time to take corrective action in the event of a cabin puncture.
- A third test found that raising the carbon-dioxide content of the cabin's



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atmosphere to 1 percent was not harmful. This could reduce the load on air regenerating systems. The air's normal CO₂ content is about 0.03 percent.

The second article told of the problems of selecting crews for interplanetary flights. It made two points:

- Since few crewmen could be carried on the first flights, each member would have to have several qualifications. "The commander of the ship will be well trained as a pilot-cosmonaut, a geodesist, and a meteorologist. Two other crewmen will be engineers who, besides serving at the flight controls, will deal with questions of geology, physics, etc. One of the crew members will be a physician who, besides caring for the health of the crew members and regulating the controls of the closed ecological system, will make botanical, zoological, and microbiological observations."
- The main problem will be the selection of individuals who are "psycho-physiologically compatible." The crew members, who will spend months or years together in the limited confines of a space ship will have to be able to work together harmoniously and maintain amicable relationships even when relaxing. Red Star said that cosmonaut candidates will first have to pass a test for neuropsychic stability in the silence chamber individually, after which they will, as a group, spend a certain time in isolation from external surroundings. Individuals unsuitable for living as a group in a small cabin on a long interplanetary flight would be discovered during this latter phase of testing. The article stated that such a test had already been conducted over a 120-day period with success.

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(Begin ~~SECRET~~) The titles and some of the content of the two Red Star articles gave the impression that the experiments were directed solely at solving problems related to manned interplanetary flights. Of much more immediate concern to the Soviets are the problems of space events of much shorter duration, such as manned space stations or laboratories orbiting the Earth or manned vehicles orbiting or landing on the Moon. The length of the experiments described in these articles would be much more compatible with these missions than with interplanetary flights.

The Soviets are, however, far from solving even the basic medical problems associated with prolonged manned flight. Soviet scientists have recently given some rather sketchy bioastronautical data from the manned Vostok 5 and Vostok 6 flights which tend to confirm early postulations on the cardiovascular deconditioning effect of exposure to prolonged weightlessness. Significant post-flight biomedical findings included:



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- Weight loss up to 3.6 percent of body weight in the case of the 5-day flight by Bykovsky.
- Abnormal blood pressure response on changing from a reclining to an upright posture on a tilt table.
- Mild changes in the bioelectric activity of the brain probably consistent with generalized fatigue.

These changes evidently are not deemed incapacitating, since one Soviet scientist, V. V. Parin, has said that he is reasonably certain that a 14-day flight could be accomplished without deleterious effects. He is unwilling or unable, however, to extrapolate beyond 14 days from the data now available. Parin and other Soviet scientists seem convinced that artificial gravity will be needed for extended space flights, but they have not defined the word "extended."

The Vostok vehicle is believed capable of supporting a 1-man, 14-day flight. The Soviets may be willing to venture a flight of over 5 but not more than 14 days, in order to determine whether the abnormalities already noted continue to increase in degree with the length of space flight or whether they reach a leveling-off point sometime after 5 days of flight.

At any rate, Soviet manned space flights of more than 14 days' duration are not in the offing, and manned Soviet interplanetary flights are not expected before 1980.

(Red Star; FTD; NORAD)

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--from the February 1964 issue of the Soviet Air Force Magazine "Aviation and Cosmonautics"



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